

# Waste Management



# Teacher's Introduction to Waste Management

## Hazardous and Solid Waste Pose Significant Challenges to the State

Kentuckians produce large quantities of both hazardous and solid waste that requires proper management to reduce their potential to contaminate the environment. Inadequate waste management in the past has resulted in a number of problems including pollution of our streams and rivers and contamination of soil and underground sources of water.

Efforts by federal, state, and local governments, and the public, to address the problems associated with waste and its disposal have recently shifted to reducing waste, recycling, and other strategies to prevent pollution in the first place. In Kentucky, the amount of hazardous waste produced by industries declined greatly during the last decade as generators implemented hazardous waste reduction strategies, due in a large part to the increasing costs and complexities of waste disposal. However, much more needs to be done to minimize the wastes produced by both large and small sources. The state also faces a formidable challenge to clean up hundreds of old hazardous waste dumps that pose serious environmental and health risks.

The state's new solid waste laws mandate that we also manage our household garbage and landfills more carefully and reduce our waste 25% by 1997. The requirements have resulted in solid waste management plans for all counties and increased efforts to recycle and reduce wastes.

The following activities involve students, both individually and as teams, in reviewing waste issues in Kentucky. They are designed to challenge students to look at their own behaviors and to make positive changes for the good of the environment.

## v Where To Get Information

The "State of Kentucky's Environment" report contains information regarding hazardous and solid waste in Kentucky and contaminated sites. Many easy-to-interpret charts and graphs are included, providing information specific for Kentucky and individual counties. Check the index in the report for general information and the expanded index in the Appendix of this guide to find a list of all the references to your county and region.

## ωβ Overview of Student Activities

### Hazardous Waste

#### **Activity 1: Hazardous Waste in Kentucky.**

In this activity students will learn about hazardous waste issues including how laws have changed the way this waste is disposed, major hazardous waste generators in the state, and what role the community plays in promoting the reduction of hazardous waste.

#### **Activity 2: Reducing Hazardous Waste in Your School**

This activity challenges students to look at how their personal behavior and buying habits contribute to environmental problems. Students will research and identify ways to reduce the use of hazardous products.

#### **Activity 3: Contaminated Waste Sites in Kentucky**

Students will view real-world problems associated with the improper disposal of hazardous waste. They will explore the legacy of waste sites that Kentucky has inherited due to poor management and disregard for the environment. Students will follow the progress (or in some cases, the lack of progress) in dealing with these sites.

### Solid Waste

#### **Activity 4: Living in a Throw-Away Society**

Students will become better informed about how our throw-away habits waste precious natural resources as well as contribute significantly to environmental degradation. The activity incorporates mathematics with decision-making skills to help students become better informed about waste management in the community.

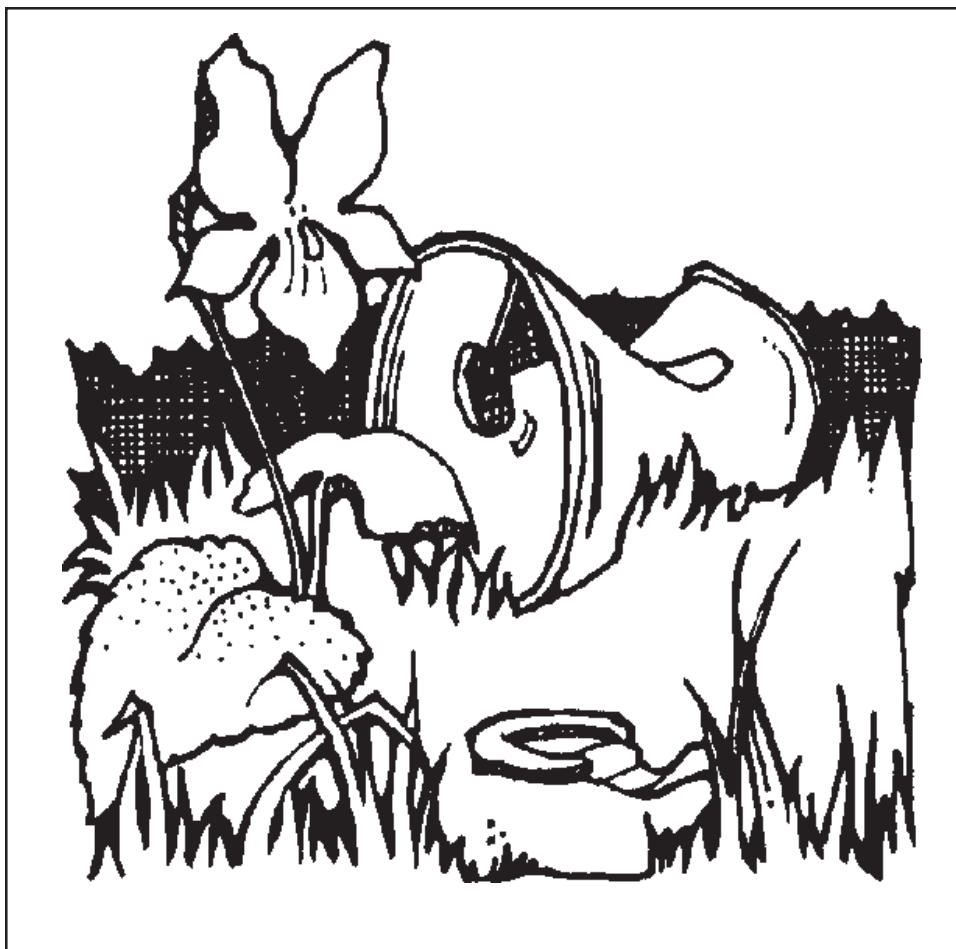
## Teacher's Introduction continued

### Activity 5: Cleaning Up Your Community

This activity will help you organize a school or class clean-up campaign. A clean up campaign will not only lead to a healthier environment, but will also enable students to learn to work in teams, develop important problem solving skills, and learn that they can make a difference.

### Activity 6: Composting to Save the Environment

This activity will allow your class to create a composting project that will result in reducing the volume of waste that is landfilled in your community. Students will apply research skills and teamwork in the development of a small compost project and learn about the scientific processes involved in waste and nutrient recycling.





# Activity 1. Hazardous Waste in Kentucky

## Instruction Sheet

### DO YOU KNOW...

- Which Kentucky waste dump played a major role in compelling lawmakers to take state and national action to regulate the disposal of hazardous waste?
- How the 6.3 million tons of hazardous waste generated in Kentucky in 1990 was disposed?
- Why some think the management of pollutants, especially hazardous waste, is a “shell game?”

### Managing Hazardous Waste: Are We Making Any Progress?

In 1967, the “Valley of the Drums,” a hazardous waste dumpsite containing more than 17,000 rusting and leaking drums filled with toxic wastes, was discovered in Bullitt County, Kentucky. The leaking drums, which were scattered around as far as the eye could see, emphasized to the nation the risks posed to people and the environment from the generation and improper disposal of hazardous wastes.

This site eventually led the state to enact emergency hazardous waste regulations in 1979 and influenced national laws as well. State hazardous waste regulations and programs have evolved since then and now include monitoring, record keeping, emergency planning, closure procedures, and identification and clean up of waste sites. While these efforts have greatly increased the oversight and management of hazardous waste generated, stored, and disposed by businesses and industries, continued illegal waste dumping and old abandoned dumps still pose significant public health and environmental threats throughout our state and nation.

Fortunately, many efforts are ongoing to find new ways of producing goods that result in less hazardous waste. Many products that are not toxic or otherwise hazardous are now available to consumers. And public concern about these issues is encouraging business and industries to reduce hazardous waste as much as possible. However, much more needs to be done to protect ourselves and the environment from unnecessary pollution.

### Purpose:

In this activity you will investigate hazardous waste issues including generation trends, waste reduction efforts, treatment and disposal methods, and contamination problems both statewide and in your community. You will also examine how your individual actions can help reduce the amount of hazardous waste produced, thereby protecting the environment.

### Procedure:

#### Part I - Investigating How Hazardous Wastes Are Managed in Kentucky

1. Obtain Worksheet #1 from your teacher. Review, discuss, and answer questions.

#### Part II - Exploring Hazardous Waste Generation and Disposal in Your Community

1. Identify one industry or business in your community that you think probably generates hazardous waste.
2. Design and conduct a research project for the chosen facility that includes the following:
  - A. Identifies the product or service produced and its role and importance in the community and your life.
  - B. Identifies the hazardous waste produced during the creation of the product or service.
  - C. Determines the history of hazardous waste management at the facility.
  - D. Analyzes the efforts by the company or business to reduce or prevent the production of this hazardous waste. (You should also consider ways the waste could be further reduced, recycled, or better controlled.)

Note: When considering the selection of a business or company for this research project, it is important to note that in addition to the large hazardous waste generators such as chemical companies, there are many smaller sources that, combined, produce a great deal of hazardous waste. Smaller sources are not usually required to report their wastes to the state. These include service stations, dry cleaners, paint manufacturers, heavy industrial equipment manufacturers, print shops, pesticide companies, and many other small businesses.



## Instructions continued

3. Report your findings to the class.
4. As a class prepare a bulletin board or write an article for the school newspaper to share your findings with your schoolmates.

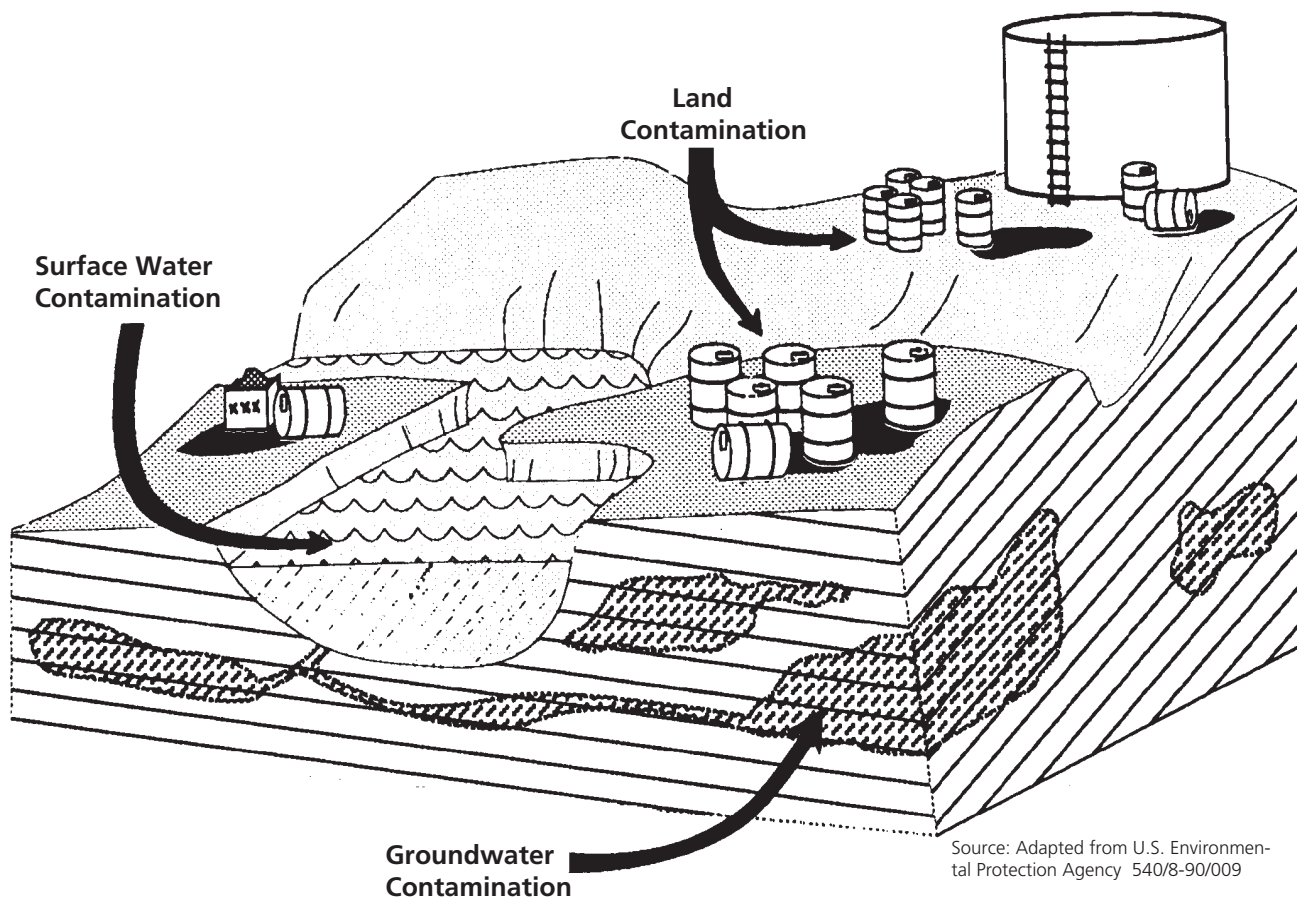
### Other Activities:

1. Research new technologies and employment opportunities in the pollution control field.
2. Research the history and current status of the nation's hazardous waste laws.

### References/Additional Resources

The Kentucky Division of Waste Management, 14 Reilly Rd. Frankfort, Kentucky 40601, 502-564-6716, regulates the generation, storage, and disposal of hazardous wastes in Kentucky. The Division also has field offices that will investigate complaints and provide more information regarding hazardous wastes generated in your community.

## Hazardous Waste Contamination Problems



# Activity 1. Hazardous Waste in Kentucky


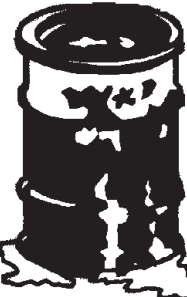


## Worksheet #1

### Laws Protect Public From Improper Waste Disposal

Hazardous wastes are created by industries during the production of many different goods and services. The generation, treatment, and disposal of these wastes can cause significant environmental and human health risks especially if wastes are improperly managed. Inadequate hazardous waste management in the past has resulted in many environmental problems we must continue to address. For example, Kentucky has nearly 1,000 hazardous waste sites that are potentially leaking contaminants into our ground and surface waters. It is likely that many more waste sites exist, but have not been discovered yet.

Environmental laws now require hazardous wastes to be managed more carefully and properly disposed to avoid pollution problems. However, some contend that the management of these wastes is a "shell game" where wastes are simply moved from one place to another. For example, landfilling hazardous waste is no longer allowed (except under certain conditions) because of the pollution it can cause to the land and water resources. Instead some waste is now incinerated (burned at high temperatures), resulting in some pollutants being released into the air.

### Examples of Hazardous Wastes and their Characteristics

 <p><b>Ignitability</b> -solvents -oils</p>	 <p><b>Corrosivity</b> -acid wastes -cleaners used to clean steel</p>	 <p><b>Reactivity</b> -water from TNT operations -used cyanide solvents</p>	 <p><b>Toxicity</b> -some pesticide wastes -substances with high levels of mercury, lead, arsenic, etc.</p>
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Source: Adapted from the U.S. Environmental Protection Agency 230-07-88-033

## Worksheet #1 continued

### Hazardous Waste Generation Declines in Kentucky

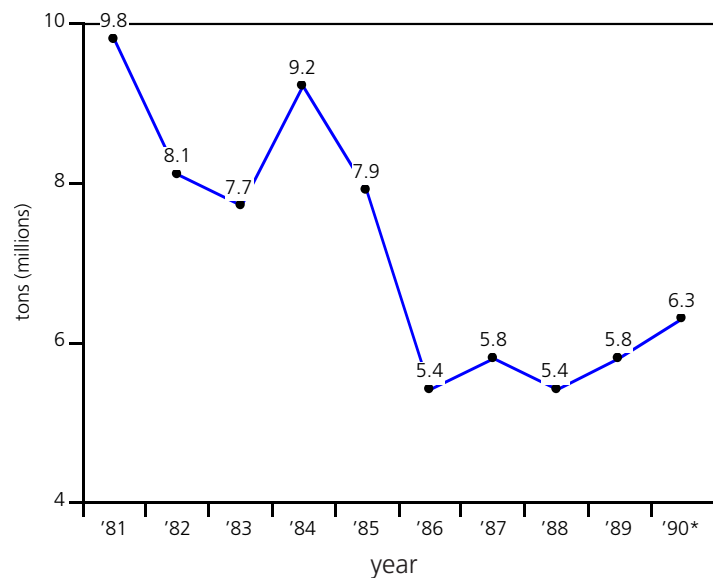
Businesses that generate hazardous waste in excess of 1,000 kilograms (2,200 pounds) must register with the Kentucky Division of Waste Management and file annual reports detailing how much and what type of waste they produced.

During 1989, 5.8 million tons of hazardous waste were produced by 338 major generators registered in Kentucky (Figure 1 and 2). This indicates a significant reduction in hazardous waste produced in 1981, when 260 industries generated 9.8 million tons of hazardous waste.

The chemical industry produced 96% of the hazardous waste generated in Kentucky. But there are many smaller businesses that also create hazardous waste. These include dry cleaners, gas stations, printers, universities, and hospitals. Many of these facilities are not required to report their hazardous wastes to the state so it is difficult to estimate how much hazardous waste is actually produced in Kentucky.

Figure 1

### Hazardous Waste Produced by Major Generators in Kentucky

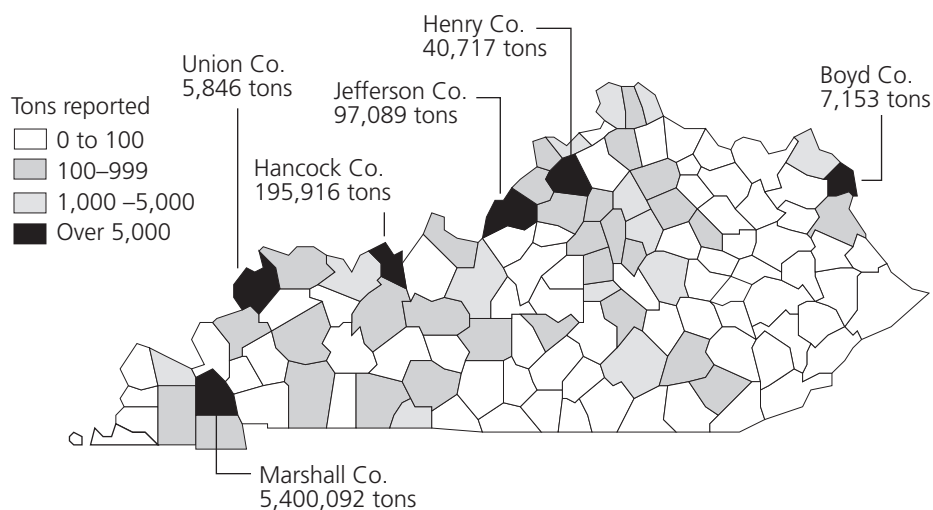


\*preliminary data

Source: Kentucky Division of Waste Management, 1992

Figure 2

### Hazardous Waste Generated in 1989 (by major generators)



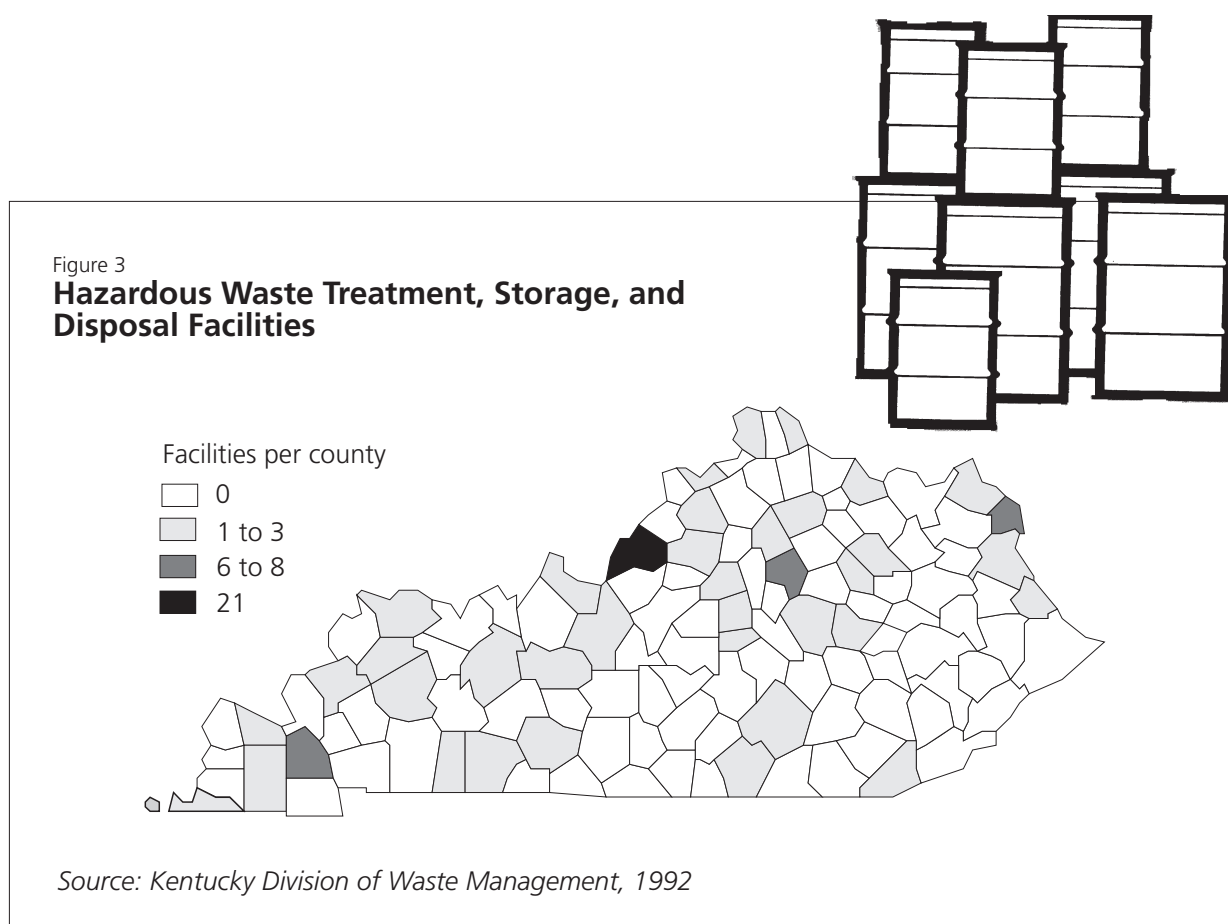
Source: Kentucky Division of Waste Management, 1992

## Worksheet #1 continued

### Industries that Treat and Dispose Hazardous Waste Receive Closer Scrutiny

The Kentucky Division of Waste Management regulates 91 facilities in the state that treat, store, and dispose hazardous waste (Figure 3). These facilities must apply for permits which specify strict controls on handling and disposing of hazardous waste. Improper waste management occurs most often at unpermitted facilities. According to state officials, these illegal sites also pose the greatest environmental problems.

Violations of hazardous waste laws and regulations at permitted treatment, storage, and disposal facilities have nearly doubled since 1985 as the state has stepped up efforts to enforce hazardous waste laws. The full extent of contamination occurring at these sites is not well known, although we do know many problems exist.





## Worksheet #1 continued

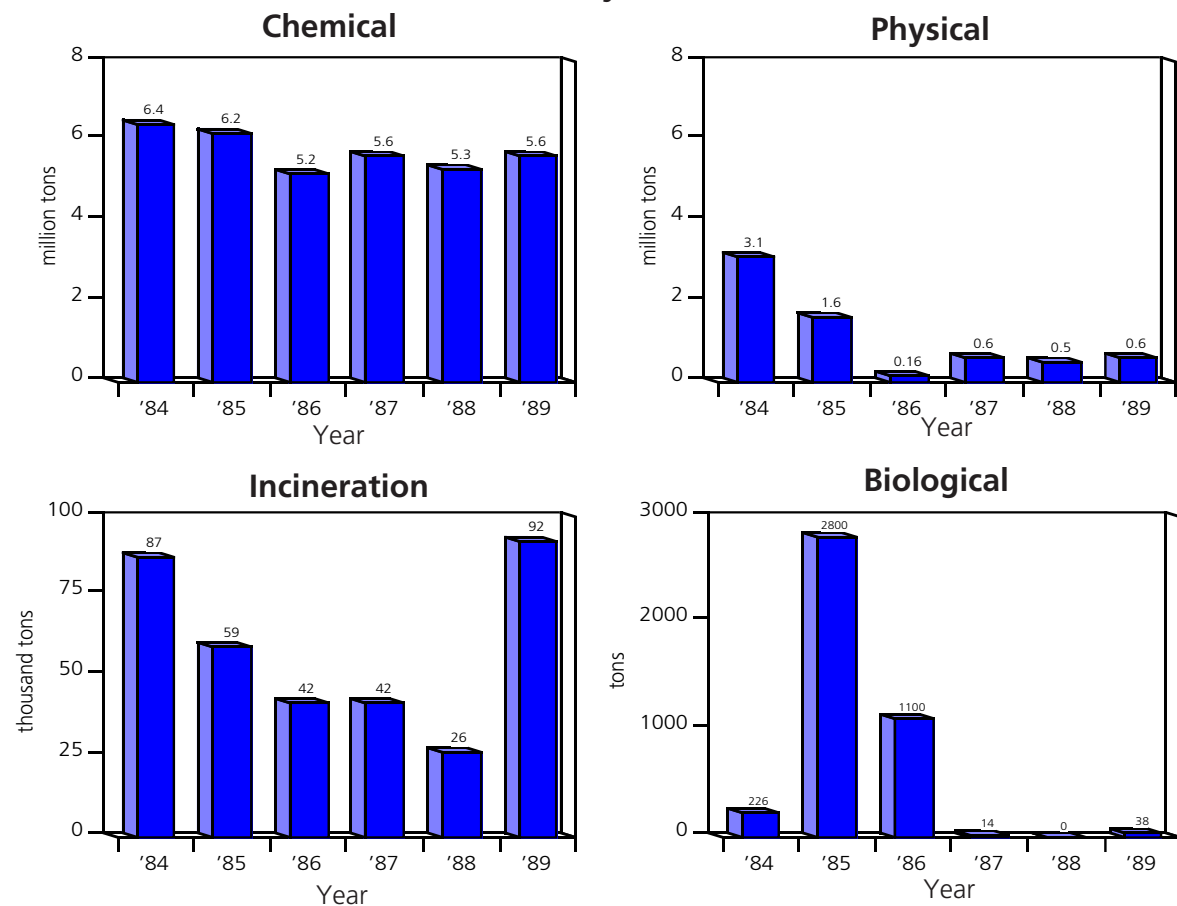
### Majority of Hazardous Waste Chemically Treated, Some Incinerated and Landfilled

Kentucky industries treat a majority of the hazardous waste produced with chemicals that react with the waste to make it legally non-hazardous. For example a company can neutralize a hazardous waste with acidic characteristics by combining it with an alkaline waste.

Other wastes were "physically treated" through distillation (boiling at certain temperatures to vaporize the waste) or fuel blending (using a certain waste to supplement a fuel burned for energy). Some waste was incinerated (burning at high temperatures) as can be seen in Figure 4. Currently there are five commercial hazardous waste incinerators operating in Kentucky. Biological treatment, such as the use of enzymes, is not used greatly in Kentucky because it is usually ineffective in treating concentrated wastes as can be seen in Figure 4.

Figure 4

#### Hazardous Waste Treatment in Kentucky



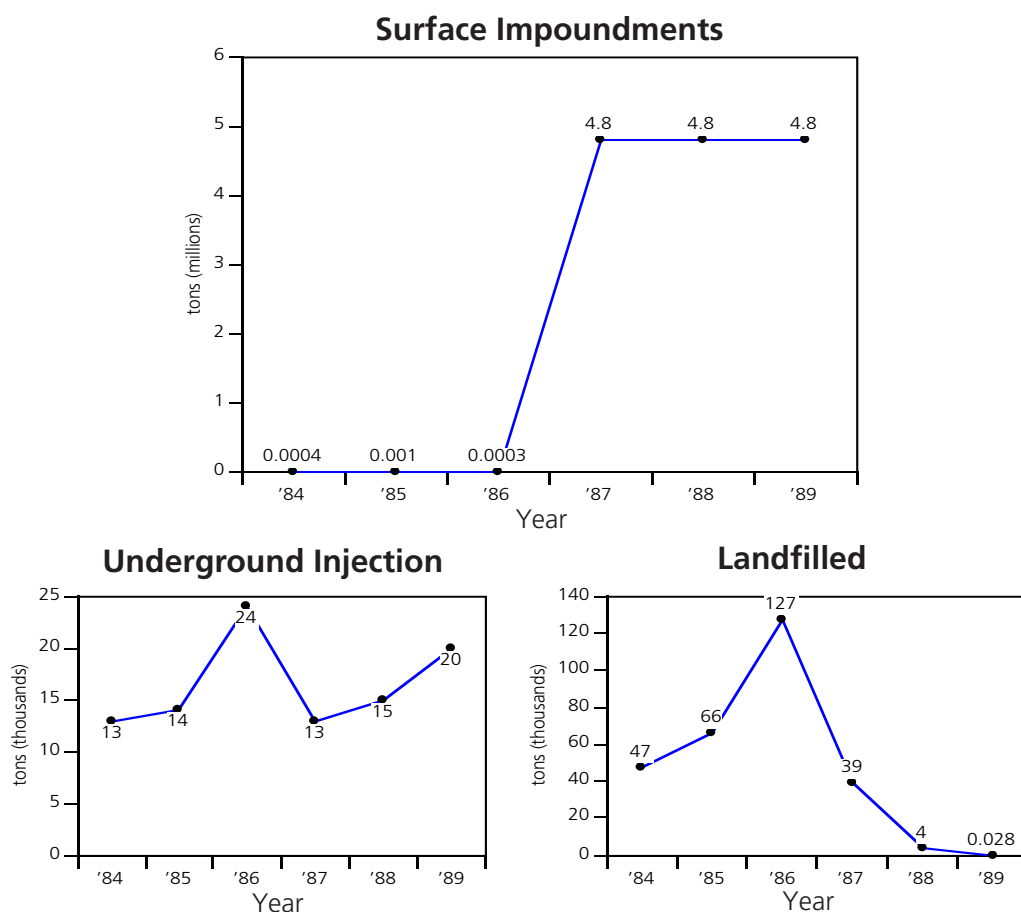
Note: 1989 data most recent available Source: Kentucky Division of Waste Management, 1991

**Worksheet #1 continued**

If a hazardous waste cannot be treated to render it nonhazardous, it can be disposed of in a number of ways. A majority of this waste was once disposed in man-made surface ponds, called impoundments ( Figure 5). However, due to water and soil contamination concerns, all surface impoundments were closed in 1989.

While many industries no longer landfill hazardous waste due to federal regulations and concern for long-term contamination of water and land, there are still two industrial landfills operating in Kentucky (Figure 5). These landfills accept limited amounts of hazardous waste. The remainder of the waste generated in Kentucky is sent out-of-state for disposal in state regulated and permitted landfills or incinerated. DuPont Chemical in Louisville is permitted by the state to dispose some of its hazardous waste by injecting it deep into the Earth through wells, a process known as "underground injection."

Figure 5

**Hazardous Waste Disposal in Kentucky**

Source: Kentucky Division of Waste Management, 1991

## Worksheet #1 continued

### Pollution Prevention Focuses on Not Creating Waste

There is increasing interest in a relatively new approach to managing hazardous and other wastes called pollution prevention. Pollution prevention involves recognizing that most pollutants discharged into the environment will have an adverse impact, as well as be expensive to monitor and clean up.

Efforts are made to prevent pollution from occurring in the first place by looking for new ways to produce goods and services that do not result in hazardous or toxic wastes or are less polluting than traditional methods. Increasing opportunities for employment in the pollution prevention field are emerging because many companies are investing in new technologies.



### QUESTIONS?

1. Compare the total amount of hazardous waste generated in Kentucky during 1981 to that produced in 1990 using the data shown in Figure 1. Determine the percent of change between these two years. Suggest possible reasons for this change.
2. Identify your county in Figure 2 and determine how many tons of hazardous waste were generated in your county during 1989.
3. Compare the amount of waste reported in your county in Figure 2 to that reported for the counties nearest you and to the counties with the greatest amounts. Why do you think hazardous waste generation varies among counties?
4. Which hazardous waste treatment and disposal practices do you think will likely be used in the future? Explain your answer.
6. Do you think that pollution prevention is a good idea? What do you think would be the result if industries, businesses, and individuals began to implement pollution prevention strategies into everyday activities?

### WHAT YOU CAN DO...

Use the power of your pocketbook. Buy environmentally responsible products and patronize businesses that demonstrate a concern for the environment.



## Activity 2. Reducing Hazardous Wastes in Your School

### Instruction Sheet

#### DO YOU KNOW..

- ♻️ How much hazardous waste your school generates?
- ♻️ Why it is important to use “environmentally friendly” products?



#### Household Hazardous Wastes Pose Significant Threat to the Environment

J.R. Williamson was amazed to see more than 100 people from his Scott County community drive up in their cars and trucks with hazardous materials from their homes and farms. The residents were not planning to dump these wastes illegally; they were there because J.R. had organized a “free” household hazardous waste collection day project with help from Toyota Motor Manufacturing, other businesses, and government agencies.

As solid waste coordinator for Scott County, J.R. knows too well the problems associated with improper disposal of hazardous wastes. He has seen many illegal dumps that have polluted the Elkhorn Creek and land where he lives and decided something needed to be done to help his neighbors find a safe way to get rid of old paints, pesticides, and other hazardous chemicals stored in garages, basements, and on the farm.

J.R. says this project is one of the ways he is “trying to solve the environmental problems that his generation has made and left for the younger generation to deal with.” The real message J.R. wanted to share with people is that they must start to consider whether products they buy involve hazardous materials when produced or disposed and substitute non-hazardous products as much as possible. It is a lot easier to avoid using hazardous materials than it is to find environmentally safe ways to dispose of them.

Household hazardous wastes and materials include paints, car batteries, chemical cleaners, solvents, and pesticides. These wastes are commonly disposed of in municipal solid waste landfills. While household hazardous wastes are estimated to make up only 1% of the solid waste we create, the potential for these wastes to contaminate soil and water is immense.

#### Some Wastes Being Diverted from Landfills

Efforts to ban or divert some household hazardous materials from landfills to prevent pollution have been recently undertaken. For example, state legislation banned the disposal of car batteries in solid waste landfills because they can contaminate the soil and water with lead and acid.

State, local, and private programs to divert used motor oil from landfills are ongoing. An estimated 19 million gallons of used automotive and industrial oil require disposal each year in Kentucky. Because it only takes one quart of used oil to contaminate a million gallons of water, programs to collect and recycle used oil are being promoted. Most full-service gas stations recycle their used oil and some accept used oil from individuals who service their own vehicles.

“Environmentally friendly” products are now available to replace many common products that contain hazardous materials. All we have to do to really make a difference is to learn more about hazardous substances by reading the labels and by choosing non-hazardous or less hazardous substitutes that are available.

#### ♻️ Purpose:

In this activity you will investigate how the products we use everyday may be polluting the environment and what we can do to reduce these threats.

#### ♻️ Procedure:

##### Part I - Identifying Hazardous Products

1. Obtain Worksheet #1 from your teacher and review.
2. As a class discuss what hazardous substances are and how you can identify them by reading the label. (Note to teacher: You may want to bring in several common products used in the home as examples.)



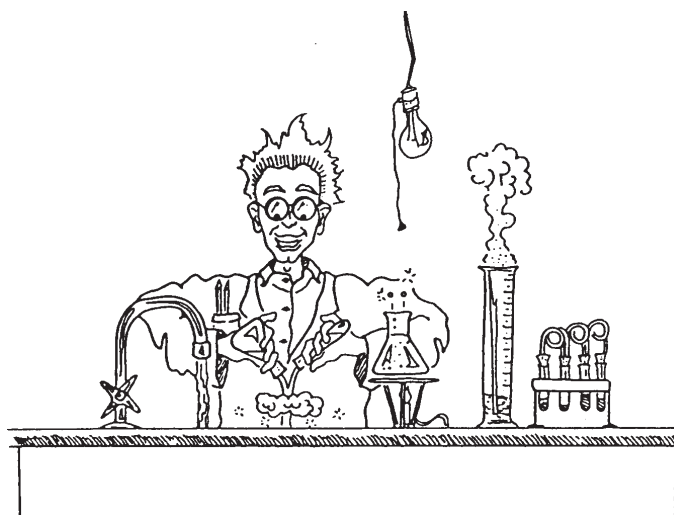
## Instructions continued

### Part II - Hazardous Materials School Survey

1. Divide into groups and, using Worksheet #1, survey your school for hazardous materials and products. Each group will survey one area of the school. School areas to survey may include the cafeteria, laboratories, the maintenance department, the lawn care/landscape department, school products storage area, etc. It is important to work with a school official when conducting the survey to minimize accidents and to also find out how these products are disposed.
2. Each group will next develop a plan to reduce, eliminate, and properly dispose of products with hazardous substances used in your school. This may include actual recommendations for non-hazardous alternatives, ways to reduce use of hazardous products, and proper disposal methods.
3. Present your group's findings to the class.

### Part III - Going A Step Further

1. As a class draft and vote on a resolution challenging your school to develop a "pollution prevention" strategy.
2. Elect a committee to present the resolution and your class findings to the school principle and other appropriate school officials for their consideration.



Source: Earth Day 1990, Campus Environmental Guide

### **Other Activities:**

1. Select a product you come in contact with everyday. This may include a leather coat, nylon hosiery, gold-plated wristwatch, denim jeans, athletic shoes, dyed tee-shirt, sunglasses, etc. Conduct a research project on the hazardous materials used or hazardous waste created during the production of this product. Prepare a summary of your findings. In your summary, discuss how our buying habits influence the production of hazardous materials and waste and what, as individuals, we can do to reduce pollution in our environment.
2. Establish a school committee to investigate the possibility of developing a household hazardous waste collection program in your city or county to keep these wastes from being disposed in your landfill. You can also create a used paint recycling project collecting unused paint that can be mixed and used to paint low-income homes or other buildings in your community. The Kentucky Division of Waste Management, Resource Conservation and Local Assistance Branch, 502-564-6716, can provide more information about how to set up such a program.

### **References/Additional Resources:**

1. For more information about a particular type of hazardous waste or the proper disposal of hazardous waste, contact the U.S. Environmental Protection Agency RCRA toll-free Hotline:

▽ 1-800-424-9346 ▽



## Activity 2. Reducing Hazardous Wastes in Your School

### Worksheet #1

#### Hazardous Waste Classification Guidelines

You can learn whether a product you are using in your home or school contains hazardous constituents by just reading the label. A waste may be hazardous if it exhibits the following characteristics.



#### 1. Ignitability

Waste exhibits the characteristic of ignitability if it has any of the following properties:

- A. It is a liquid and has a flash point less than 60 degrees Celsius (140 degrees Fahrenheit).
- B. It is not a liquid and is capable (under standard temperature and pressure) of causing fire through friction, absorption of moisture, or spontaneous chemical changes; and, when ignited burns so vigorously and persistently that it creates a hazard.
- C. It is an ignitable compressed gas.
- D. It is an oxidizer.



#### 2. Corrosivity

Waste exhibits the characteristic of corrosivity if it has either of the following properties:

- A. It is aqueous and has a pH level less than or equal to 2 or greater than or equal to 12.5.
- B. It is a liquid and corrodes steel at a rate greater than 6.35 mm per year at a test temperature of 55 degrees Celsius.



#### 3. Reactivity

Waste exhibits the characteristic of reactivity if it has any of the following properties:

- A. It is normally unstable and readily undergoes violent change without detonating.
- B. It reacts violently with water.
- C. It forms potentially explosive mixtures with water.
- D. When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
- E. It is a cyanide- or sulfide-bearing waste which when exposed to pH conditions between 2 and 12.5 can generate toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health or the environment.
- F. It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement.
- G. It is readily capable of detonation, explosive decomposition, or reaction at standard temperature and pressure.



#### 4. Toxicity

Wastes exhibit the characteristics of toxicity if it contains any of the following chemicals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, endrin, lindane, methoxychlor, toxaphene, 2,4-D or 2,4,5-T silvex.



# SCHOOL HAZARDOUS MATERIALS SURVEY

## Directions

1. Inventory the products used around your school that you think might contain hazardous materials. Be sure to check the label to determine the harmful affect.
2. Research non-hazardous products that can substitute for those that are hazardous, other ways to reduce hazardous product use, and proper disposal methods for the products you identify.

Product	Harmful Effect	Non-Hazardous Substitutes/ Reduction Opportunities	Proper Disposal Methods

Worksheet #1 continued





## Activity 3. Contaminated Waste Sites in Kentucky

### Instruction Sheet



#### DO YOU KNOW...

- ♻ How many hazardous waste sites are in your county, where they are, and what is being done to clean them up?
- ♻ Why Fleming County is one of the most intensively monitored places on the Earth?

### Thousands of Hazardous Waste Dumps Leaking Pollutants into Our Environment

Maxey Flats in Fleming County, Kentucky, is one of the largest contaminated, radioactive waste sites in the United States. This site has become one the state's biggest environmental nightmares and a serious financial burden as well. Shut down in 1977, the problems associated with this site will haunt Kentuckians for many generations to come.

How did this come to be? In 1962, land for the Maxey Flats nuclear waste disposal site was secretly purchased and construction was inconspicuously completed. By 1963, Maxey Flats, the second commercial, low-level radioactive waste disposal facility in the United States - and the largest in the free world - quietly began operating, nestled among the gently rolling Kentucky hills and well-tended dairy farms.

The idea of locating the facility in our state was formed when Kentucky policy makers believed a radioactive waste landfill would attract industrial facilities that used nuclear energy. However, the economic boom that was anticipated did not materialize. Instead, the state inherited a site containing a major inventory of cancer-causing, long-lived radioactive waste brought here from research laboratories, electric utilities, government and health care facilities, manufacturing companies, and nuclear power plants located throughout the United States. The state shut the site down in 1977 after radioactive material was discovered leaking from the 51 trenches where the waste was buried.

The problems and discussions regarding this site are endless and serve as a good introduction to the issue of contaminated waste sites. Hundreds of sites, while not as severe as Maxey Flats, are known to exist in the Kentucky, with some in every county. Progress toward cleaning up these sites has been very slow. In most cases, this has been due to the tremendous costs associated with cleaning up the pollution.

#### ♻ Purpose:

In this activity, you will find out more about contaminated waste sites statewide and in your community. You will investigate what is being done, or needs to be done to clean them up, and prevent new ones from occurring. Investigating the sites and tracking their clean up also provides a valuable glimpse of how government functions, the limit of technology in resolving environmental problems, and the economic and social impact of irresponsible waste disposal.

#### ♻ Procedure:

##### Part I - How Many Waste Sites Are There in Kentucky?

1. Obtain Worksheet #1 from your teacher. Review, discuss, and answer questions.

##### Part II - Investigating Waste Dumps in Your Community

1. As a class, design a survey for schoolmates, family members, neighbors, and others to identify waste dumps in your community and to determine how concerned people are about this issue. Many of the state's worst sites were old landfills, junkyards, and open garbage dumps. Each student should interview at least 3 people.
2. As a class, discuss the survey results and compile a list of dumpsites.
3. Determine the individuals in your community who have the responsibility to clean up dumpsites. Submit your list of sites to the appropriate officials and encourage them to investigate these sites. Request a copy of the investigation reports.



## Instructions continued

### Part III - Making A Difference

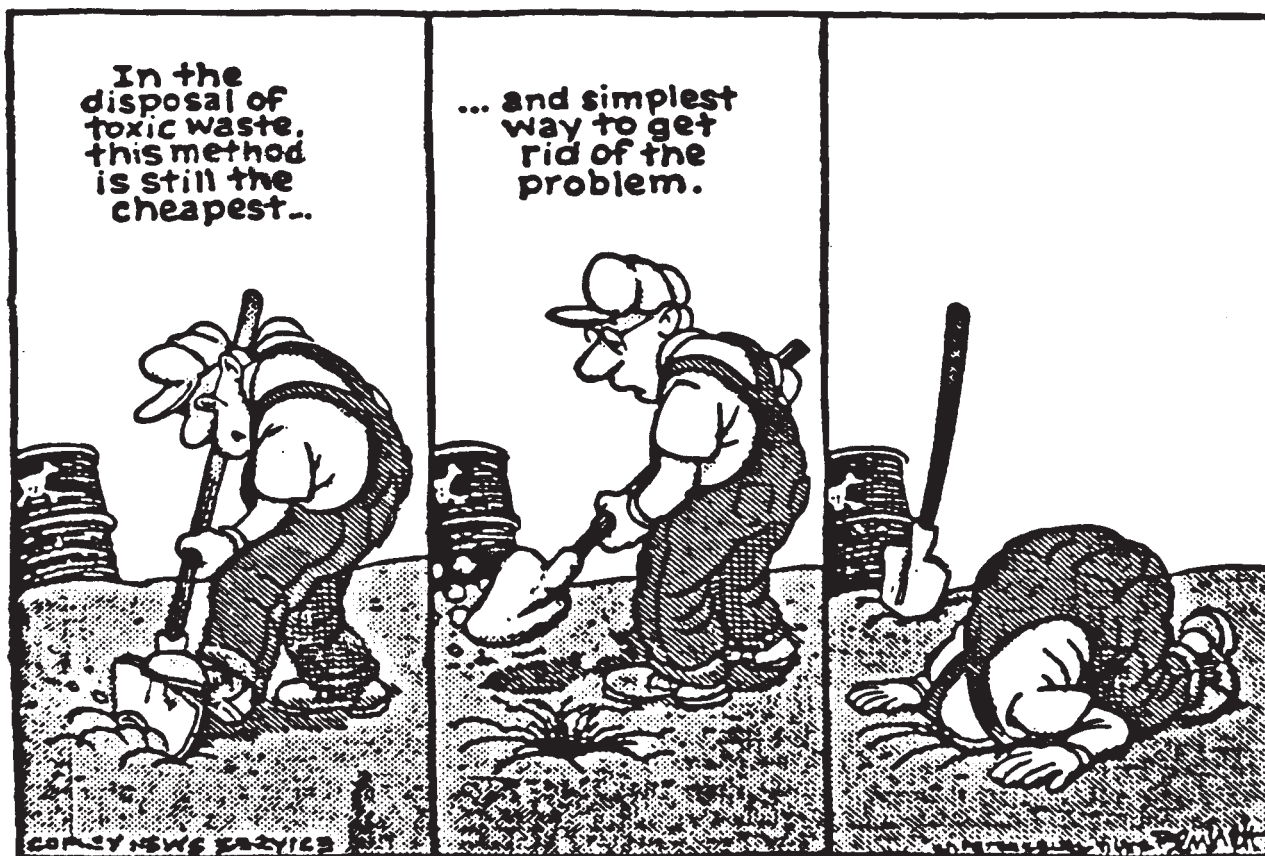
1. As a class, select one waste site in your community and monitor the progress of its clean up. Develop a strategy to focus attention on the site and work with the appropriate officials to get the site cleaned up.
2. Create a class display showing the progress of the clean up and the steps taken to address it.
3. Summarize your findings. Evaluate how effective your strategy was, major obstacles and problems, and final conclusions, including how to prevent future dumpsites in your community.

### **Other Activities:**

Conduct a research project to investigate the federal Superfund program and its effectiveness in cleaning up the nation's worst contaminated sites.

### **References/Additional Resources:**

The Kentucky Division of Waste Management, State Superfund Branch, oversees the clean up of hazardous waste sites. Contact the division at 14 Reilly Rd., Frankfort, KY 40601, 502-564-6716, for more information regarding waste sites or to report a waste dump in your community.



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## Activity 3. Contaminated Waste Sites In Kentucky

### Worksheet #1

#### Contaminated Waste Sites Continue to Grow in Number

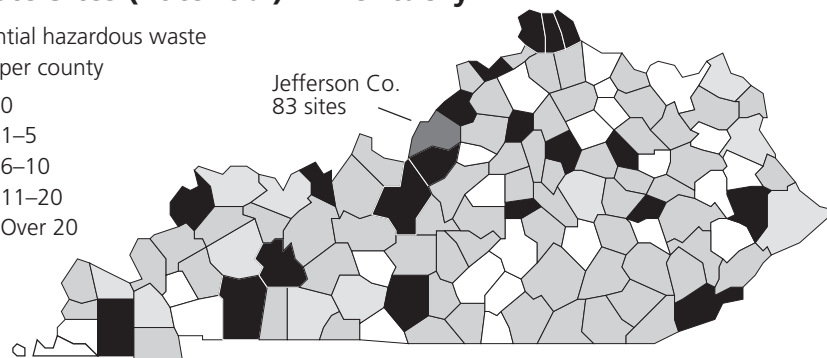
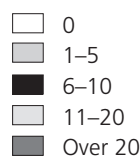
There are hundreds of hazardous waste dumps in Kentucky posing a significant threat to the environment from pollutants leaking into the land, air, and water. By 1992, more than 536 potential hazardous waste dumpsites were known to exist (Figure 1). The number of dumpsites grows yearly as more are discovered by the public and state officials.

The investigation and clean up of hazardous waste dumpsites is primarily the responsibility of the Kentucky Division of Waste Management. However, sites that are highly contaminated, or pose an immediate threat, may be taken over by the U.S. Environmental Protection Agency (U.S. EPA), the federal agency responsible for enforcing national environmental laws, as part of the federal "Superfund" program. This program is responsible for investigating and cleaning up the nation's worst sites, some of which are located in Kentucky. Relatively few of the contaminated sites nationwide are taken over by the U.S. EPA. Most sites must be dealt with by the state.

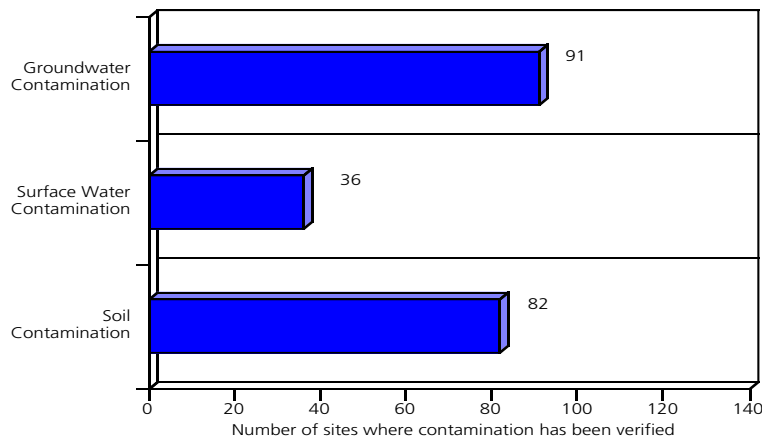
Figure 1

#### Hazardous Waste Sites (Potential) in Kentucky

Potential hazardous waste sites per county



#### Contamination Detected at Hazardous Waste Sites



Source: Kentucky Division of Waste Management, 1991

**Worksheet #1 continued**

Figure 2

**Site and Date listed****Kentucky Federal Superfund Sites and Status**

**Valley of the Drums**  
Brooks–Bullitt Co. (1981)

This illegal dump may contain 17,000 drums of waste. 4,000 drums were removed from the surface, and a cap was placed over the remainder of the drums buried at the site.

**B.F. Goodrich/Airco** (2 sites)  
Calvert City-Marshall Co. (1982)

In the past many companies disposed its waste in its own landfill. Over 80,000 tons of toxic waste were disposed in two landfills located next to the Tennessee River.

**Brantley Landfill**  
Island–McLean Co. (1990)

Over 250,000 tons of toxic aluminium dross (a granular, powdery, waste left from aluminum recycling) was buried in an old strip mine near the City of Island.

**Caldwell Lace & Leather**  
Auburn-Logan Co. (1990)

This is the disposal site for wastes from a leather tannery. Contaminated water and solids were poured onto the land and plowed under.

**Distler Brickyard**  
West Point-Hardin Co. (1982)

This abandoned brick manufacturing plant was used in the 1970s for illegal storage of hazardous waste. More than 2,300 drums were removed from the site.

**Distler Farm**  
Louisville-Jefferson Co. (1982)

This 3-acre site, near the Ohio River, was discovered when a flood floated away some of the over 800 drums found at the site. Floodwaters carried the drums a mile from the site.

**Fort Hartford Coal**  
Olaton-Ohio Co. (1990)

1.3 million tons of toxic aluminum dross was placed in a 120-acre abandoned underground limestone quarry. Thousands of gallons of contaminated water is a major concern.

**General Tire & Rubber**  
Mayfield-Graves Co. (1990)

This 58-acre landfill was used by the company to dispose of wastes during the 1970s. Over 200 tons of hazardous waste were buried in trenches.

**Green River Disposal Site**  
Maceo–Davies Co. (1990)

This former landfill was known to have illegally accepted over 1,000 drums of hazardous waste. Groundwater contamination has affected water wells of nearby residents.

**Howe Valley**  
Howe Valley-Hardin Co. (1987)

This former landfill was constructed in a giant sinkhole. This allowed pollutants to contaminate nearby springs used for drinking water supplies.

**Lee's Lane Landfill**  
Louisville-Jefferson Co. (1982)

This 112-acre landfill and junkyard, next to the Ohio River, received over 2 million cubic yards of wastes between 1940 and 1975. Portions of the landfill flooded every year.

**Maxey Flats**  
Hillsboro-Fleming Co. (1986)

The state permitted the disposal of an estimated 5 to 8 million cubic feet of low-level radioactive waste. The waste has contaminated groundwater, soil, and surface water.

**Newport Dump**  
Wilder-Campbell Co. (1982)

This former landfill is located 250 feet from where Kenton County pumps water for approximately 75,000 people. It has contaminated the groundwater.

**Red–Penn Sanitation Co.**  
Peewee Valley-Oldham Co.(1989)

A former 85-acre landfill located on the banks of the Floyd's Fork accepted over 10,000 drums of toxic wastes between 1967 and 1974.

**Smith's Farm**  
Brooks-Bullitt Co. (1984)

The Smith family operated a legal and illegal landfill at this site for many years. There may be up to 200,000 drums of waste buried there.

**Tri–City Indstrl. Disp. Site**  
Books-Bullitt Co. (1989)

This 57-acre former landfill operated both with and without permits. Fires and explosions occurred often. Organic chemicals are contaminating spring water used for drinking.

**National Electric Coil**  
Dayhoit-Harlan Co. (1992)

This company rebuilt electric motors from 1951 to 1987. Enormous amounts of chemicals including PCBs were released when the Cumberland River covered the site during floods.

**National Southwire Aluminum**  
Hawesville-Hancock Co. (1992)

This facility makes aluminum from ore by heating it in giant electric pots. The liners of the pots become very contaminated. The toxic pot liners were buried in a landfill which has contaminated groundwater in the area.



## **Worksheet #1 continued**

### **Costs to Clean Up Waste Sites Estimated in the Millions of Dollars**

Cleaning up hazardous waste sites is expensive, time-consuming, and often difficult. The average cost to investigate and clean up a contaminated site is estimated at \$4 million. State officials must often rely on enforcement actions to force individuals or companies responsible for a site to clean it up.

Kentucky has 19 dumpsites presently included on the federal Superfund list (Figure 2). Three of Kentucky's federal Superfund sites have been declared "clean." They are the Newport Landfill in Campbell County, Valley of the Drums (A.L. Taylor) in Bullitt County, and Lee's Lane Landfill in Jefferson County.

Kentucky's other federal Superfund sites are in various stages of study or clean up. Technical complexities, along with difficulty in locating responsible parties and negotiating financial settlements, make the clean up of these waste sites a long-term process.

### **Clean Up of Waste Sites Expensive**

Kentucky's Superfund sites are a sobering reminder of the costs and dangers these waste dumps pose to both public health and the environment. In 1981, Kentucky established a hazardous waste fund to help finance the cleanup of hazardous waste sites. The fund is financed through fees charged to those who generate or handle hazardous waste in Kentucky. However, the fees collected are still far less than the amount needed to address the contaminated waste sites in Kentucky.

Laws requiring hazardous waste generators, transporters, and disposal facilities to document that waste is managed and disposed of properly have helped prevent many illegal waste sites. Unfortunately, waste dumps will continue to be created because of the high cost of proper disposal and lack of concern or information regarding the hazards and liabilities associated with improper waste.

Promoting the reduction or prevention of hazardous waste and rigorous enforcement of state and federal laws are necessary to ensure that hazardous waste is managed properly and that future illegal waste sites are prevented.

### **536 Sites Thought to Be Just Tip of the Iceberg**

The identification and cleanup of the state's 536 hazardous waste dumpsites pose a significant challenge to the state. It is suspected that these sites are just the "tip of the iceberg." With a more aggressive site discovery effort, many more sites would likely be found. You may know of a dump in your community that needs to be investigated.

Some states are using public service advertisements and toll-free hotlines to encourage citizens to report suspected sites. Thousands of hazardous waste sites have been discovered in Ohio through this citizen involvement approach and Kentucky officials believe there would be a similar response here. Louisville has established a 24-hour hotline (502-574-DUMP) so citizens can report suspected dump sites. The public plays an important role in helping to identify waste dumps so we can minimize the public health and environmental risks posed by contaminated sites.



## Worksheet #1 continued

### QUESTIONS?

1. How many potential wastes sites exist in your county? Do you think there may be more? Why?
2. What concerns you most about hazardous waste dumpsites?
3. In which areas of the state would you expect to find the most contaminated sites? Explain your answer.
4. How many federal Superfund sites are located in Kentucky? Are there any in your county? Do you think the people who live around these sites should be concerned about whether they are cleaned up? Explain your answer.

### WHAT YOU CAN DO...

1. Dispose trash and garbage properly. Household garbage often contains hazardous materials and other pollutants that can contaminate the environment. All counties now offer trash collection. Make sure that your trash is properly disposed of in a permitted landfill.
2. Report open dumps. We all have a responsibility to report illegal trash dumps to our local government officials. Encourage family members and friends to do the same.






Source: Earth Day 1990, Campus Environmental Guide

## Activity 4. Living in a Throw-Away Society

### Instruction Sheet

#### DO YOU KNOW

-  Why we produce 73% more garbage per person each year than we did 30 years ago?
-  How much garbage Kentuckians generate and have to dispose each year?
-  How much garbage is illegally dumped in Kentucky?

#### Solid Waste Issues Among Kentuckians' Top Environmental Concerns

Kentuckians became very concerned with waste management issues after the state was recently targeted as a cheap disposal site for out-of-state garbage from the Northeast United States. Hundreds of thousands of tons of out-of-state waste were coming into the state and being disposed in landfills that were leaking pollutants into the environment. This highly publicized issue focused much-needed attention on the fact that many of our landfills were not properly constructed to contain pollution and that they were quickly being filled with other states' garbage.

The "garbage crisis" is also affecting the rest of the country, due to the fact that we generate vast amounts of solid waste that must be properly disposed. Kentuckians are producing nearly 75% more garbage per person than was the case 30 years ago. We have become a "throw away" society, often considering immediate convenience more important than the long-term health of our environment. The disposal of the increasing amount of waste creates pollution problems, economic costs, and lowers our land values.

In Kentucky, about 10% to 20% of the four million tons of garbage we produce each year is illegally dumped over hillsides and in streams. There are thousands of open dumps littered across our state, posing risks to human health and contaminating the environment. However, we are making progress in addressing this problem by requiring all counties to provide voluntary garbage collection services to residents. Most counties now have ordinances that do this compared to only 14 counties in 1991. Kentucky's new solid waste laws also require each county to identify open dumps, plan a strategy to clean them up, and prevent new ones from occurring.

These and other environmental problems associated with garbage have increased our awareness of the need to reduce garbage, recycle, and reuse materials. Kentucky now has a goal to reduce the weight of solid waste going into landfills 25% by 1997. Many communities, including numerous schools, have initiated recycling and composting programs to help reduce the need for landfilling wastes.

#### Purpose:

Exploring waste management issues in your community will help you become better informed about how our throw-away habits waste precious natural resources as well as contribute significantly to environmental degradation. Becoming more informed about waste management in your community will allow you to make better decisions regarding the waste you generate. Your efforts to reduce, reuse, and recycle will greatly benefit our environment, preserve our forests, rivers, streams, and conserve our energy resources.

#### Procedure:

##### Part I - Learning More About Solid Waste

1. Obtain Worksheet #1 from your teacher. Review, discuss, and answer questions.

##### Part II - How is Your Garbage Disposed?

1. Divide into groups and outline a research project that assesses solid waste generation, disposal methods, and recycling in your county. A good background document is your county solid waste plan. This plan details how much waste is being produced, how it is collected, where it is disposed, the number of open dumps, and recycling goals. The plan is readily available from your county judge/executive's office. Ask your school or local library to obtain a copy so it can be easily accessed.
2. Prepare a summary of your findings, including any problems or waste issues facing your county, and propose possible solutions. Present a report to the class.





## Instructions continued

### Part III - Doing Your Part to Reduce Solid Waste

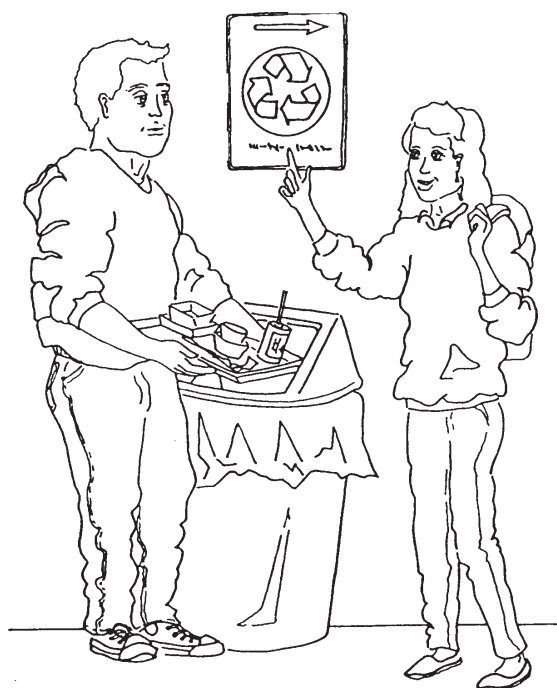
1. Meet with your group to prepare a strategy to reduce the amount of waste produced in your community. Use the information your group assembled earlier regarding generation rates and waste types to create a county waste reduction strategy. The strategy should outline how much waste could be eliminated from being landfilled due to recycling, composting of yard and food waste, and other waste reduction efforts. For example, if 25% of your county's waste is yard waste and yard waste was required to be composted instead of landfilled, then waste disposal in the landfill would decrease by 25%.
2. Each group will present their findings to the class. As a class discuss these strategies and what needs to be done to encourage your school and community to reduce solid waste.
3. Initiate recycling and other waste reduction strategies at your school.

### **Other Activities:**

1. Conduct a home survey of the household trash your family produces in one week. Determine how many pounds of garbage your family creates, what type of waste is produced and how much, and how it is disposed. Tabulate the results for your class and discuss ways to reduce, reuse, or recycle the waste. Prepare a display of your findings.
2. Divide into teams and debate the following theme: "Resolved: The Commonwealth of Kentucky must establish mandatory recycling for all communities."
3. Fight junk mail. Last year, Americans received **60 billion pieces** of junk mail. Most were thrown away unopened. The environmental impact of junk mail is alarming. Rivers are polluted by mills making the paper. Vast amounts of energy are consumed delivering boxcar loads of letters. Some 75,000 acres of forest are harvested each year just to provide paper for mail-order catalogs. Ask school personnel to save the junk mail received in one week; count and weigh the total that would be produced for the school year. Do the same for the junk mail received in your home. Write to Mail Preference Service, c/o Director Marketing Association, P.O. Box 3861, New York, NY 10163-3861; ask the association to remove your school and family's names from many direct junk mail lists. Allow three months, then check the results. Encourage others in your community to have their names removed also.
4. Scenario -Your company just invented an all-natural soft drink but you do not know which container is the most "environmentally friendly" for your new product. Divide into groups and have each group research a different container (ie. plastic, glass, aluminum, carton, etc.), how it is produced, energy used, waste created, etc. Each group will report its findings to the class and then weigh the costs against the environmental benefits to choose the best container for your soft drink.

### **References/Additional Resources:**

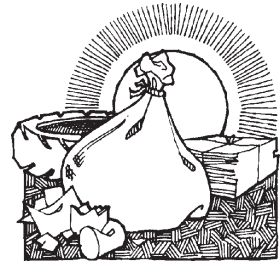
1. Solid waste coordinators have been hired in 40 counties to monitor local solid waste issues and needs. Contact your county judge/executive's office to find out who your coordinator is and how to reach her/him.
2. Teachers: Many interesting classroom activities are contained in the teacher's guide "Waste: A Hidden Resource in Kentucky." Contact the Kentucky Division of Waste Management, 502-564-6716, to obtain a copy.
3. "The Consumer's Handbook for Reducing Solid Waste," is a practical guide suitable for middle and high school students. The guide is available from the U.S. Environmental Protection Agency by calling toll-free 1-800-424-9346; ask for publication EPA530-K-92-003.





## Activity 4. Living in a Throw-Away Society

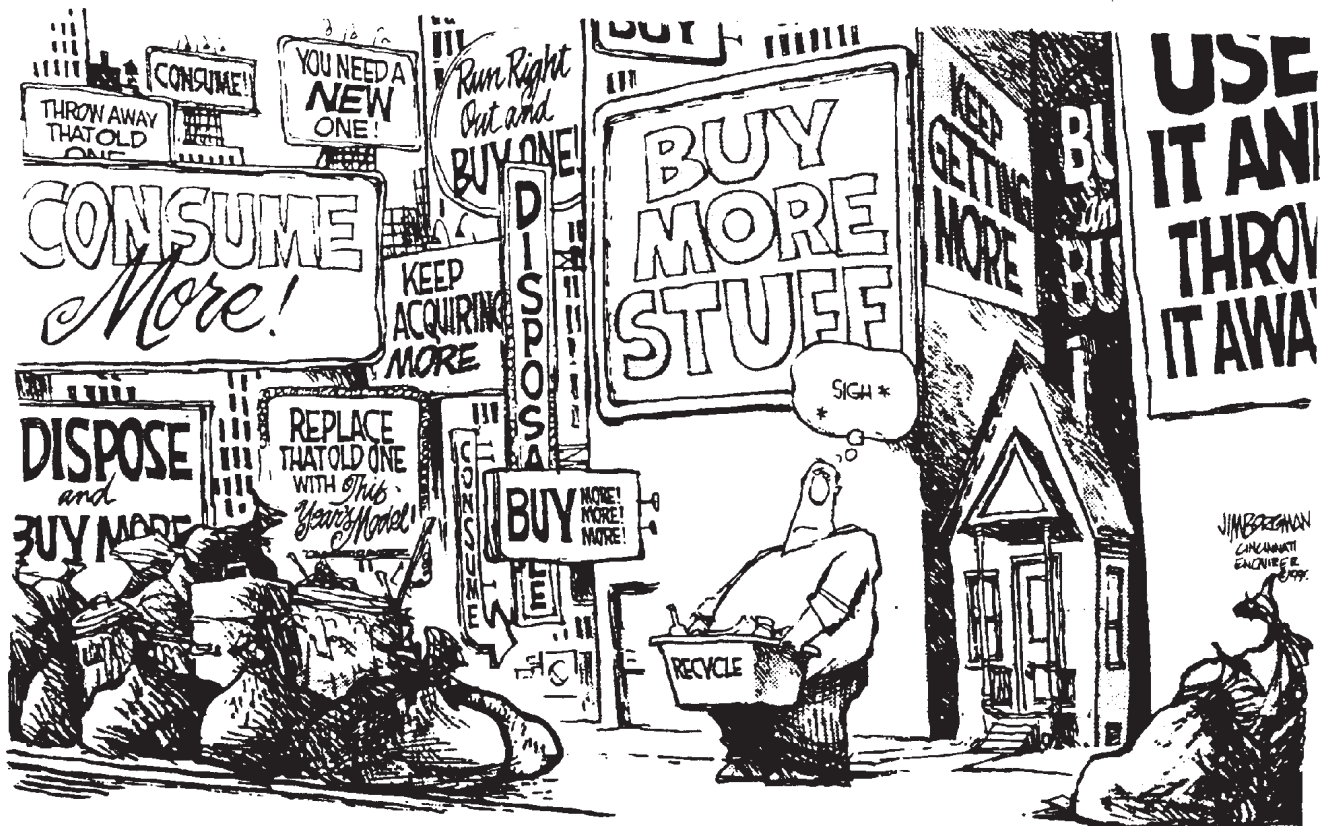
### Worksheet #1



#### Amount of Garbage Produced More Than Doubles in 28 Years

When was the last time you thought about your garbage? Probably never. But the garbage we produce is having a tremendous impact on our environment. And the problem will not go away. Consider the following facts.

- ◆ National trends show that between 1960 and 1988, the amount of garbage generated in the United States more than doubled (Figure 1).
- ◆ During 1960, a person typically produced 2.7 pounds of garbage a day. Today, the average person generates about 4 pounds of garbage daily.
- ◆ All this waste causes serious environmental problems because most of it is disposed in landfills, which can contaminate into our water and land resources.
- ◆ Kentucky generates an estimated 4.65 million tons of solid waste each year.
- ◆ Kentuckians are expected to generate 51 million tons of garbage during the next 20 years, according to projections prepared by each county.



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## Worksheet #1 continued



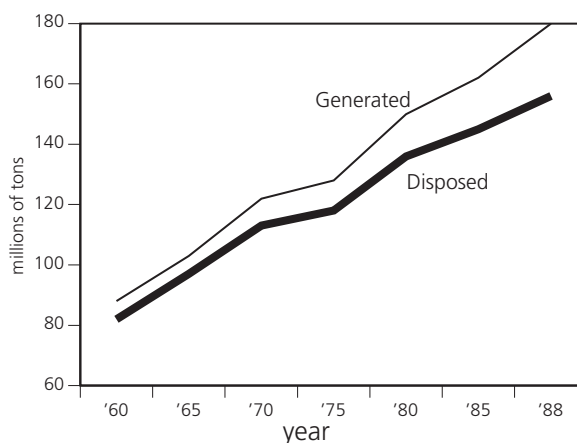
### Paper and Yard Waste Account for More Than Half of Waste Disposed at Landfills

The solid waste stream is composed of seven major categories of waste: paper products, yard wastes, metals, plastics, glass, food wastes, and miscellaneous wastes including wood and clothing.

The generation of these wastes is expected to increase, with paper and paperboard leading in volume, according to national projections as can be seen in Figure 2.

Figure 1

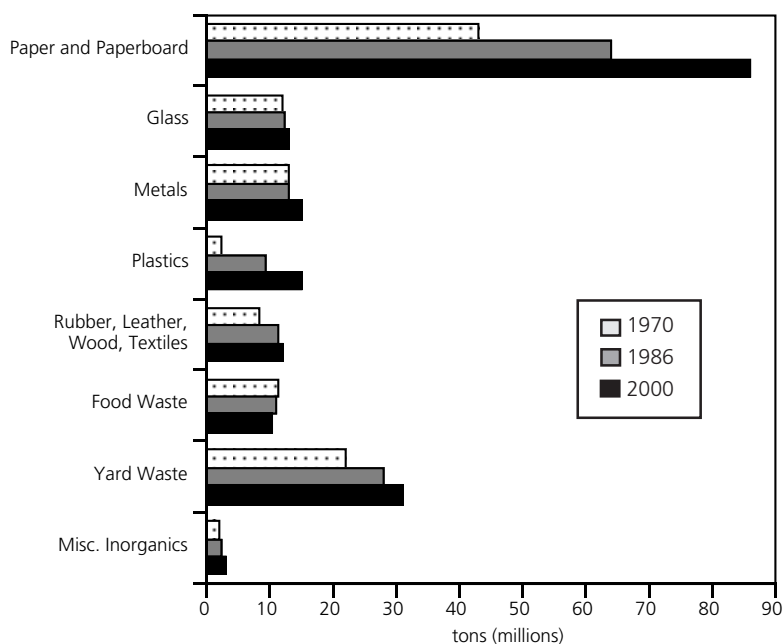
### Solid Waste Generation and Disposal in the U.S.



Source: Franklin Associates, Ltd., 1988

Figure 2

### Types of Solid Waste Generated in the U.S.



Source: Franklin Associates, Ltd., 1988

## Worksheet #1 continued

### Stricter Requirements Will Result in Fewer But Larger Landfills

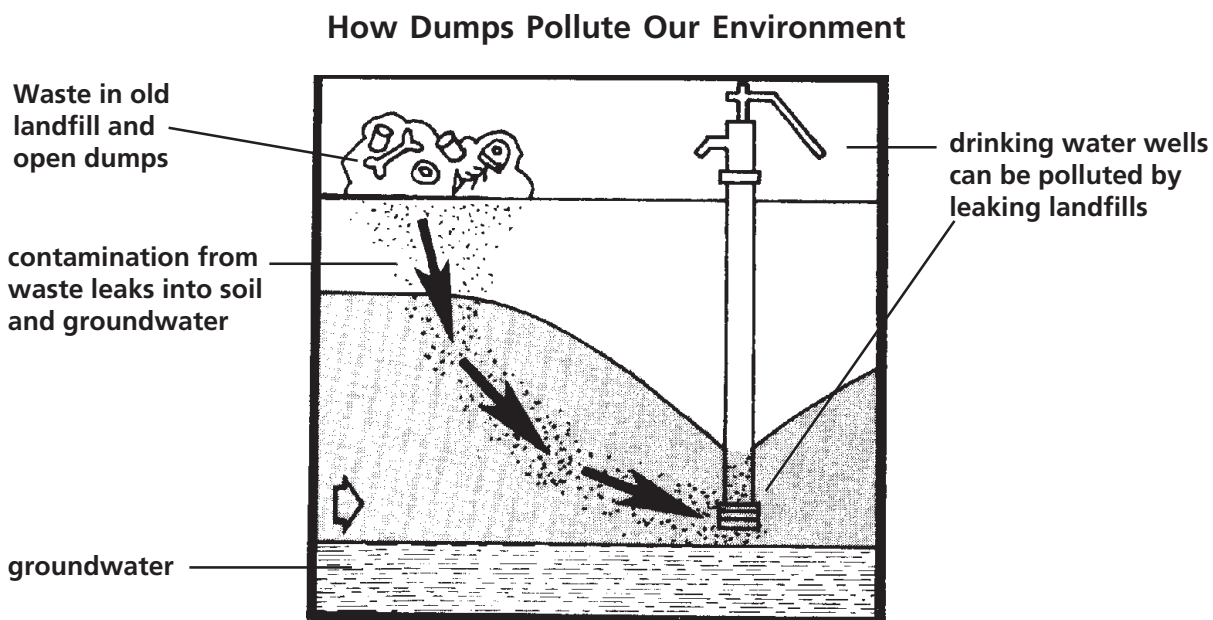
Most of our garbage will continue to be disposed in landfills well into the future. Stricter state solid waste landfill construction and operation regulations, passed in 1992, however, will mean higher costs for us to dispose of our wastes. Due to these rules, more than half the 70 solid waste landfills operating in the state have closed. Thirty landfills have been allowed to remain open until 1995. Then they will have to meet even more stringent requirements including double landfill liners and extensive groundwater monitoring.

The Kentucky Division of Waste Management estimates that construction costs to build a new landfill under the new solid waste regulations will range from \$150,000 to \$300,000 per acre. In view of this cost, experts believe that in order to be economically feasible, the size of an average landfill in Kentucky will increase and handle much greater quantities of waste daily.

The state is encouraging counties to band together to site regional landfills that would serve multiple counties in order to minimize garbage disposal costs. Two regions - Bracken, Fleming, Lewis, Mason, Robertson, and Nicholas counties; and Boone, Kenton, and Campbell counties-have indicated that they will use a regional multiple county approach to managing their waste. Other counties are also working together to try to keep disposal costs low and encourage recycling.

With more stringent environmental safeguards, fewer landfills, and less competition, concern has been expressed that household garbage pickup and disposal rates will increase dramatically. The state estimates that average household garbage disposal bills will increase from the current rate of \$4-\$6 a month, to \$9-\$12 a month. Counties will be required to annually report garbage collection and disposal fees to the state beginning in 1993. This will allow the state to monitor cost increases and determine if there is a need for rate controls.

But we can either pay for proper disposal now or pay even more later to clean up the environmental contamination caused by leaking landfills and illegal dumps. Our old landfills will continue to leak indefinitely. Even the new state laws may not be enough to guarantee that landfills will not leak, but they will help a great deal.



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**Worksheet #1 continued**

Figure 3

**How the Nation's Waste is Managed**

	1980		1986		1988		1995		2000	
	tons*	%	tons*	%	tons*	%	tons*	%	tons*	%
Recycling	14.5	10	18.3	11	23.5	13	48.3	24	54.4	25
Waste-to-Energy	2.7	2	9.6	6	24.5	14	45.0	23	55.0	26
Incineration <sup>1</sup>	11.0	7	3.0	2	1.0	2	0.5	0.3	0.1	<0.1
Landfill	121.4	81	136.5	82	130.5	73	106.0	53	106.5	49

\* in millions of tons per year

<sup>1</sup> Incineration, (burning at high temperatures without energy recovery)

Source: Franklin Associates, Ltd., 1990

**Waste Disposal Options Include Recycling**

Although landfills will continue to be the primary way we dispose our solid waste, an emerging technology called "waste-to-energy" is expected to grow steadily in the future (Figure 3). Waste-to-energy facilities burn large quantities of solid waste to create energy. These facilities have been slow to develop in Kentucky and may not represent any significant portion of the state's waste disposal in the future. This is due to public opposition to the air pollution created when garbage is burned and the large amounts of garbage needed to make these facilities economical.

The most effective way to protect ourselves and the environment from the problems caused by waste is to reduce the production of garbage as much as possible by consuming less, choosing products carefully, and recycling everything we can.

**QUESTIONS?**

1. Use Figure 1 to calculate the percent change between the amount of solid waste generated over the past 28 years (1960 and 1988). Based on this trend, project how much solid waste the nation will generate in another 28 years (1989 and 2016).
2. What changes in our life-styles do you think have contributed to the increase in the waste we produce?
3. Which type of solid waste do you think can be reduced the most by individuals like yourself? Explain your answer.
4. Are you willing to pay more to have your garbage disposed in a landfill that has better safeguards to protect the environment? Explain your answer.
5. In the average community, everyone pays the same amount to have their garbage disposed, regardless of how much they produce or recycle. Do you think people would recycle and reduce waste more if they had to pay for disposal based on the amount of garbage they set out on the curb to be picked up? Explain your answer and whether or not you think "paying by the pound" is a good idea.
6. Describe ways your family and school could reduce the amount of garbage produced.

**WHAT YOU CAN DO...**

1. It is up to us to recycle as many different materials as we can. If your family and school are not recycling, you may be able to get recycling and waste reduction efforts started. Find out more about reducing wastes and get a project started as soon as possible.
2. Contact your local government officials and encourage them to establish a recycling program for your community if you don't already have one.
3. Consume less-enjoy more!!! When you do buy, choose environmentally responsible products, especially those that use as little packaging as possible, are made from recyclable materials, and can be reused or recycled.

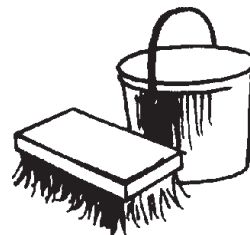


# Activity 5. Cleaning Up Your Community

## Instruction Sheet

### DO YOU KNOW. . .

- ♻️ How your actions may be contributing to land and water pollution?
- ♻️ Why some people choose to illegally dump their waste?
- ♻️ What you can do to stop illegal dumping in your community?



### Thousands of Open Dumps Polluting Kentucky's Environment

The Jackson County senior high school class had enough. Open dumps in their county were not only an eyesore they were also polluting the community's water and land. Armed with a video camera, the students taped these sites and challenged the community to clean them up. The video was broadcast on cable television and effectively educated the public and government officials about local environmental problems and needs.

These problems do not exist just in Jackson County. Every community has illegal dumps. At least 270,000 to 410,000 tons of the garbage produced in Kentucky are illegally dumped or burned each year. This represents 10% to 20% of the state's total solid waste stream.

In addition to being unsightly, illegal dumps cause problems with disease, odors, and rodents. Open dumps also contaminate ground and surface water.

Thousands of illegal dumps exist in Kentucky. For some residents, it is cheaper and easier to illegally dump their waste than it is to dispose garbage properly. The cost to taxpayers to clean up open dumps and litter is great. State and local governments spend millions of dollars each year to remove roadside litter and clean up open dumps. Local garbage collection programs, now active in most counties, should help prevent new dumps. Local governments must also identify open dumps and establish a schedule for the clean up of open dumps. However, the cost to clean up these garbage sites will be costly.

Other efforts such as the Kentucky Transportation Cabinet's Adopt-a-Highway Program have been quite successful in cleaning up roadside litter and trash. Currently, 2,085 groups in Kentucky have adopted 12,397 miles of roadways. This represents 48% of the state-maintained highways. Kentucky's Adopt-a-Highway program is ranked second in the nation of the 46 states with these programs. Sixteen Kentucky communities also have certified Clean Community Programs designed to develop strong solid waste management programs at the local level. Community efforts, such as the Ohio River Sweep, the Kentucky River Sweep, and other stream and roadside cleanups, have actively involved the public in addressing local environmental problems.

### ♻️ Purpose:

There are many successful, annual, clean-up campaigns across Kentucky in which you or your class can participate. However, you may want to organize your own campaign. A cleanup-campaign will not only lead to a cleaner environment, it will serve to educate the public about how our actions impact the environment and how, as a community, we can make a difference.

### ♻️ Procedure:

#### Part I - Getting Organized

1. As a class, discuss the problem of open dumps in Kentucky and your community.
2. Identify a stream, roadside, or other open-dumping area that requires clean up. You may want to consult the county solid waste coordinator, city manager, or your local sanitation department to help identify a dumpsite or area that may be appropriate for clean up.
3. Design a strategy to organize and carry out a clean-up campaign. Obtain Worksheet #1 from your teacher to use as a guide. (Tips: Plan plenty of time to organize event. Spring and Fall are good times to sponsor a clean up. Try to get as many businesses and agencies to help sponsor your event. They can contribute to copying costs, graphics and printing for brochure, publicity etc.)
3. Divide into the following four committees:

A. Publicity campaign committee - Responsible for getting the word out about the clean up which may include radio and newspaper announcements, television coverage, and possible publication of a brochure outlining who, what, where, when, and why. Always be sure to list all sponsors on any information that is distributed



## Instructions continued

about the clean-up campaign. Be sure to take pictures. Interview participants during the clean up about why they volunteered and their views on open dumping.

B. Procurement committee - Responsible for seeking donations of trash bags, dump truck service, landfill operator cooperation, photo developing, refreshments, tee-shirts, etc. Track the amount and type of waste collected during the clean up.

C. Safety committee - Responsible for making sure the clean up area is safe for the general public, contacting local emergency services, or asking the local hospital or paramedics to set up a first aid station for the day. Make sure volunteers sign waiver forms (Worksheet #1) and are properly outfitted. Monitor clean up operations.

D. Coordinating committee - Responsible for overall coordination at the site. Recruit volunteers from school and other community groups to work at check-in points, to hand-out bags/gloves, etc.

### Part II - Assessing the Results

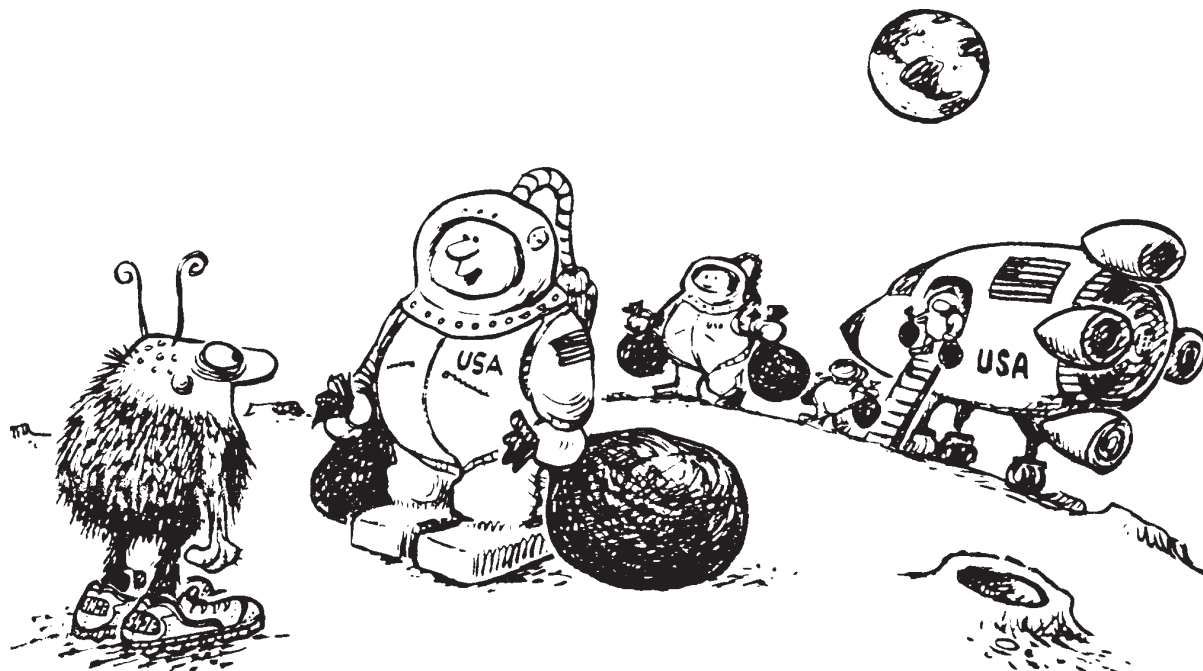
1. After the project has been completed, create a school display with photos of volunteers and their comments about the project, how much waste was collected, and other interesting items your class found or learned from the clean-up campaign.

## Other Activities

1. Your school can participate in the Adopt-a-Highway program to help reduce roadside litter and trash. Contact the Transportation Cabinet, State Office Building, Frankfort, KY 40601, 502-564-4890, for more information.
2. Organize a letter-writing campaign to local or state officials to focus attention on dumps in your community.

## References/Additional Resources

1. Kentucky Water Watch Program, "Dumpbusters" can provide you with information on organizing a clean up. Contact the coordinator at 14 Reilly Rd., Frankfort, KY 40601 or call 502-564-3410.
2. To report illegal dumps, contact your local county judge/executive's office or the Kentucky Division of Waste Management at 502-564-6716.



**We come in peace. Where's the landfill?**

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## Activity 5. Cleaning Up Your Community

### Worksheet #1

### FROM START TO FINISH

#### Your Checklist for a Successful Clean-up Campaign

Task	Person In Charge	Date	Status
<b>three to six months</b>			
1. Select site 2. Select date 3. Secure list of volunteers 4. Secure list of organizations 5. Make list of media 6. Contact media 7. Design and produce posters 8. Plan publicity 9. Make a budget 10. Plan food and drink 11. Plan entertainment 12. Select master of ceremony 13. Raise money 14. Solicit in-kind donations			
<b>one to three months</b>			
15. Order litter and trash bags 16. Identify and invite VIPs 17. Prepare registration forms 18. Prepare and send press releases 19. Make maps 20. Make markers and signs 21. Arrange for first aid 22. Arrange for trash disposal 23. Arrange for recycling 24. Print brochures			
<b>Final Week</b>			
25. Assemble materials 26. Prepare registration area 27. Final publicity			
<b>Afterward</b>			
28. Prepare post-event publicity 29. Write thank-you letters			



## Volunteer Registration and Liability Waiver

**I, the undersigned, for the duration of the event, will:**

- \* Always wear work gloves, protective clothing, and life jackets when on or near the water.
- \* Be careful when handling broken glass, sharp objects, aerosol cans and containers with chemical residue.
- \* Be on the lookout for snakes, wasps, poison ivy, and hornets in debris piles or vegetated areas.
- \* Not disturb any large drum type containers or other suspicious/dangerous materials and will report their location immediately.
- \* Use common sense about lifting heavy objects.
- \* Never work alone.
- \* Report any accidents or injuries immediately.
- \* Ask permission when entering private property and identify myself as a cleanup volunteer.

I also understand that the nature of this activity involves certain dangers and risks and I agree to indemnify and hold harmless the \_\_\_\_\_ and all others involved in the cleanup campaign and its volunteers, from all liability, loss, and expense, including but not limited to damages, legal expenses and cost of defense, in any matter arising from my participation in the cleanup or related events.

Participant Signature

Date

Signature of parent or guardian if participant under 18

Date

Name (please print)

Telephone

Street Address

City, State, Zip

Group



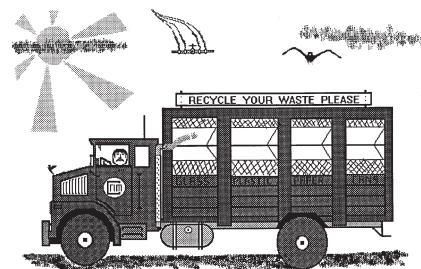


# Activity 6. Composting to Save the Environment

## Instruction Sheet

### DO YOU KNOW. . .

- ♻️ What we can learn from nature about recycling waste?
- ♻️ Why we are not doing more to reduce the amount of waste we produce?



### Composting Yard Waste Gives the Environment a Helping Hand

Many of us are familiar with the need to recycle our aluminum cans. But a waste stream often overlooked is yard and food waste. An estimated 30% of the solid waste disposed in Kentucky landfills is yard and food waste that could be recycled, saving valuable landfill space.

Nature designed a system that operates in a cycle - leaves fall from trees, settle to the ground, and slowly break down into dark crumbly humus, releasing nutrients as they decay. Humans have altered the natural recycling process by removing leaves and other yard waste and sending them to a landfill instead of allowing them to decay.

"Composting" is a technique that uses nature's way of recycling. Materials are allowed to decay - with a little help from us - and are then put back into the soil in gardens and flower beds. Composting yard and food wastes returns valuable nutrients to the soil, rather than having them compacted with pollutants in a landfill. This helps to preserve precious landfill space and enriches our soil. It's a lot of fun too!

The problem is, however, as consumers we have had little incentive to limit the amount of waste we create, because we are not charged for disposal based on the amount we produce. Many people are also unaware of the importance of recycling the nutrients found in these wastes.

Public opinion has changed significantly during the past few years and awareness of the need to reduce and recycle wastes is growing. In 1991, the state adopted a goal to reduce the weight of wastes received at solid waste landfills 25% by 1997. This is an important step in protecting the environment and conserving our natural resources.

There is no historical data available to document the amount of material recycled in Kentucky. However, it is estimated that recycling materials such as cans, glass, and some plastics, on average, has reduced residential wastes three to ten percent nationwide. Much more could be reduced if food and yard wastes were composted as well.

Promising ways to tackle our solid waste problems include wasting less, recycling more, and composting food and yard wastes as much as possible. By following nature's example, we can reduce the waste going to landfills and protect our environment from pollution.

### ♻️ Purpose:

This activity will help you create a composting project for your class to demonstrate that some of the waste landfilled can be recycled. The project could become an exciting model for other schools, groups, and communities that are also interested in reducing wastes. (Note: This activity is an excellent opportunity for involving other classes and ultimately the entire school in composting and other methods of recycling.)

### ♻️ Procedure:

#### Part I - Investigating How Composting Works

1. Prepare a research report on composting - its history, science, and techniques.

#### Part II - Finding Out More About Waste in Your School

1. Divide into two groups:

Group A: Estimate how much food waste produced by your school could potentially be composted.

(Tip - Ask cafeteria workers to set up a special trash bin for just food waste, including left-over cafeteria food. Make sure an announcement is made at lunch to ask students to use the appropriate trash can for just their food waste - no plates, napkins, etc. Request that cafeteria workers weigh the food waste bags each day for one week prior to disposal. Calculate the average daily weight of the food waste created by your school based on the total weekly weight. Multiply this by the number of school days to get the total weight of the food waste generated at your school.)



## Instructions continued

Group B: Investigate how grass clippings and other yard wastes created at your school are disposed. Determine how these wastes could potentially be recycled through composting and other recycling methods. Also determine how much the school could save in landfill disposal costs through composting or recycling yard waste.

2. Both groups should summarize their findings and present them to the class.

### Part III - Creating a Class Compost Project

1. As a class, develop a compost "pilot project" for the food waste produced by your class. Set up a special trash bin to collect the food waste your class creates during lunch each day for one week. Have the bags of food waste weighed each day prior to their disposal. Calculate the average daily food waste weight produced during lunch by your class and the total generated by your class during a school year.

2. Decide which type of compost bin and method would be the most successful for your situation.

3. Construct or have the maintenance department or shop class construct your bin in a predetermined site (you can build a bin out of recycled wooden shipping pallets which your school can get at a hardware store or elsewhere, or out of other donated or salvaged materials). Note: The site should be out of the way, and in at least partial sun. Do not put the bin in a "high traffic" area where odor may offend those passing by (this is not usually a problem but is a possibility if something goes wrong with the decomposition process).

4. Acquire a large pile of carbon sources before you start saving food wastes, since these two components must be layered for proper and speedy decomposition, although composting on a small scale can be as simple as piling food/yard waste in a mesh "bin" and turning occasionally. Carbon sources are leaves, wood chips, straw, sawdust, tree bark, or shredded paper.

5. Collect the food waste generated by your class during lunch in a designated bin in the cafeteria.

6. Design a compost "recipe" and assign teams to attend to the compost project daily.

### Part IV - Reaping the Rewards

1. With time, the compost material should be a nice, rich humus color that can be used for a vegetable or flower bed. Select a small site around the school yard and plant a flower or vegetable garden. Try using native wildflowers donated by local merchants.

2. Prepare a summary of the findings about the compost project and present to school officials. Submit an article to your local or school newspaper about the project. If successful, your class may want to encourage the school to set up a committee to investigate a compost program for all the school's food and yard waste.

## Other Activities:

1. Start a compost project for your family's yard or food waste.

2. Create a flyer about how fellow students can reduce, reuse, or recycle their waste.

3. Choose a product that has excess packaging and write to the manufacturer urging that the package be streamlined. Encourage the company to use recycled materials whenever possible.

## References/Additional Resources:

1. Your local extension service is a good place to get information on composting. The office is listed in your telephone book under county offices.

2. *Garbage Magazine* published an interesting article about composting techniques in the Oct./Nov. 1992 issue, pages 44-48.

3. Teachers: Many interesting classroom activities are contained in the teacher's guide "Waste: A Hidden Resource in Kentucky." Contact the Kentucky Division of Waste Management, 502-564-6716, to obtain a copy.

4. "School Recycling Programs: A Handbook for Educators," presents step-by-step instructions on how to set up a school recycling program. The handbook is available from the U.S. Environmental Protection Agency by calling toll-free 1-800-424-9346 and asking for publication EPA/530-SW-90-023.

